

Habitat use during spring migration: Remote sensing meets movement ecology

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Introduction

- Careful timing and small-scale selection for high quality food during spring migration is crucial for the survival and successful reproduction in many migratory species
- For Arctic breeders like the greater white-fronted goose (*Anser a. albifrons*, WFG) recent climate, habitat and management changes alter conditions at spring stopovers and breeding sites

Aim: Quantify sensitivity of WFG to small-scale landscape configuration, phenology and land-use intensity during spring migration between Central Europe and northern Russia

Data sets

- High resolution GPS tracks of >150 individual WFG, spring 2007 – 2017
- ACC measurements for >50 individual GPS tracked WFG, 2014-2017
- Optical and SAR time series data (20x20m) from Sentinel 1 & 2, 2016 -2017
 - 9 reflectance bands
 - Vegetation indices: phenology
 - Radar data: land-use intensity



Stopover selection

- Criteria-based trajectory segmentation
- Stopover where goose is >48 h in a radius of 30 km

Behaviour annotation

- Supervised Recursive Partitioning and Regression Trees of ACC properties
- odbaZ, fdpsZ, odba and roly best classifiers
- Classification into flight, resting and feed/walking

Step selection functions

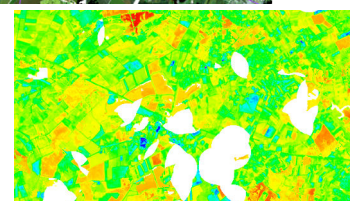
- Pairing of each true GPS position (30 min) in a stopover with 100 random steps
- Two-step conditional logistic regression with vegetation indices (here Tasseled Cap Variables)
- ID as random factor and **behaviour as interaction**

Results

- Strong preference for high wetness during resting and feeding
- General avoidance of high brightness (bare surface)
- No apparent influence of greenness
- The two geese prefer sleeping on the water and feeding in wetlands
- Predicted high availability of suitable habitat in this stopover

Discussion and Outlook

- Sentinel data are suitable to explore small-scale habitat use
- Green wave migration not confirmed, maybe overlayed by other parameters
- Generalisation and comparison of habitat use in stopovers for full data set along whole migration corridor
- Improvement of optical time series (additional filtering, cloud fill with landsat data)
- Scale up to large-scale habitat preferences for selection of stopovers and migration route



preference
avoidance